

REMARKS

Claims 1, 3-12, 15-23, 25, 26, 28 and 31-35 are pending in the Application.

Claims 33-35 are allowed. Claim 16 is objected to as being dependent upon a rejected base claim but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 1, 3-12, 15, 17-23, 25, 26, 28 and 31 are rejected under 35 U.S.C. §103(a). Claims 1, 4-12, 15, 17, 18 and 20-23 are provisionally rejected on the ground of non-statutory obviousness-type double patenting.

Applicant thanks Examiner Burkhardt for discussing the present Office Action with Applicant's attorney, Bobby Voigt, on December 20, 2010.

I. REJECTIONS UNDER 35 U.S.C. §103(a):

The Examiner has rejected claims 1, 3-12, 15, 17-21, 25, 26, 28 and 31 under 35 U.S.C. §103(a) as being unpatentable over Goodwin et al. (WO 02/28548) (hereinafter "Goodwin") in view of Badyal et al. (WO 98/58117) (hereinafter "Badyal"). Furthermore, the Examiner has rejected claim 22 under 35 U.S.C. §103(a) as being unpatentable over Goodwin in view of Badyal and in further view of Vaartstra et al. (U.S. Patent No. 6,402,126) (hereinafter "Vaartstra"). Additionally, the Examiner has rejected claim 23 under 35 U.S.C. §103(a) as being unpatentable over Goodwin in view of Badyal and in further view of Ruta et al. (U.S. Patent No. 6,012,647) (hereinafter "Ruta") and The Generation and Measurement of Aerosols (hereinafter "Bailey"). Applicant respectfully traverses these rejections for at least the reasons stated below and respectfully requests the Examiner to reconsider and withdraw these rejections.

- A. Claims 1, 3-12, 15, 17-21, 25, 26, 28 and 31 are not properly rejected under 35 U.S.C. §103(a) as being unpatentable over Goodwin in view of Badyal.

Most if not all inventions arise from a combination of old elements. *See In re Rouffet*, 47 U.S.P.Q.2d 1453, 1457 (Fed. Cir. 1998). Obviousness is determined from the vantage point of a hypothetical person having ordinary skill in the art to which the patent

pertains. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1457 (Fed. Cir. 1998). Therefore, an Examiner may often find every element of a claimed invention in the prior art. *Id.* However, identification in the prior art of each individual part claimed is insufficient to defeat patentability of the whole claimed invention. *See Id.* In order to establish a *prima facie* case of obviousness, the Examiner must show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references for combination in the manner claimed. *In re Rouffet*, 47 U.S.P.Q.2d 1453, 1458 (Fed. Cir. 1998). The Examiner must provide articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (cited approvingly in *KSR International Co. v. Teleflex Inc.*, 82 U.S.P.Q.2d 1385, 1396 (U.S. 2007)).

As understood by Applicant, the Examiner admits that Goodwin does not teach that the exciting medium, into which the atomized coating forming material is introduced, is pulsed, as recited in claim 1. Office Action (10/7/2010), page 3. The Examiner asserts that Badyal teaches the above-cited claim limitation. *Id.* The Examiner's reasoning for modifying Goodwin with Badyal to include the above-cited claim limitation is "to achieve a greater level of structural retention." *Id.* The Examiner's reasoning is insufficient to establish a *prima facie* case of obviousness in rejecting claims 1, 3-12, 15, 17-21, 25, 26, 28 and 31.

The Examiner relies upon page 9, lines 22-29 of Badyal as support for the Examiner's reasoning for modifying Goodwin with Badyal to include the above-cited missing claim limitation of claim 1. Badyal teaches that it has been noted, particularly in the case of the polymerization of compounds of formula (III) ($\text{CH}_2 = \text{CR}^7\text{C}(\text{O})\text{O}(\text{CH}_2)_n\text{R}^5$), that low power pulsed plasma polymerization produces well-adhered coatings which exhibit excellent water and oil repellency. Page 9, lines 22-25. Badyal further teaches that the greater level of structural retention in the case of pulsed plasma polymerization can be attributed to free radical polymerization occurring during the duty cycle off-time and less fragmentation during the on-time. Page 9, lines 26-29.

Hence, Badyal teaches that low power pulsed plasma polymerization produces well-adhered coatings which exhibit excellent water and oil repellency in the case of the polymerization of compounds of formula (III) ($\text{CH}_2 = \text{CR}^7\text{C}(\text{O})\text{O}(\text{CH}_2)_n\text{R}^5$). Furthermore, Badyal teaches that the greater level of structural retention in the case of pulsed plasma polymerization can be attributed to free radical polymerization occurring during the duty cycle off-time and less fragmentation during the on-time.

There is no language in Badyal (and in particular page 9, lines 22-29) that makes any suggestion to modify Goodwin to pulse an exciting medium, into which the atomized coating forming material is introduced (missing claim limitation) in order to achieve a greater level of structural retention (Examiner's reasoning). Instead, the cited passage in Badyal focuses on using low power pulsed plasma polymerization in the case of polymerization of compounds of formula (III) ($\text{CH}_2 = \text{CR}^7\text{C}(\text{O})\text{O}(\text{CH}_2)_n\text{R}^5$). The Examiner has to provide some rational connection between the passage in Badyal that is the source of the Examiner's reasoning and the missing claim limitation. The Examiner's source of reasoning (page 9, lines 22-29 of Badyal) does not provide reasons as to why one skilled in the art would modify Goodwin to include the missing claim limitation of claim 1. Accordingly, the Examiner has not presented a *prima facie* case of obviousness for rejecting claims 1, 3-12, 15, 17-21, 25, 26, 28 and 31. *KSR International Co. v. Teleflex Inc.*, 82 U.S.P.Q.2d 1385, 1396 (U.S. 2007).

Further, as stated above, in order to establish a *prima facie* case of obviousness, the Examiner must provide articulated reasoning with some rational underpinning. *KSR International Co. v. Teleflex Inc.*, 82 U.S.P.Q.2d 1385, 1396 (U.S. 2007). That is, in order to sustain the rejection of claim 1 for obviousness, the Examiner has to provide some rational connection between the Examiner's reasoning for modifying Goodwin with Badyal and the missing claim limitation.

As stated above, the Examiner's reasoning for modifying Goodwin to include the above-cited missing claim limitation is to achieve a greater level of structural retention. However, there are many ways to improve the level of structural retention. The Examiner needs to explain why in particular one skilled in the art would modify

Goodwin to pulse an exciting medium, into which the atomized coating forming material is introduced (missing claim limitation) in order to achieve a greater level of structural retention.

Hence, the Examiner's rationale does not provide reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would modify Goodwin to include the above-cited missing claim limitation of claim 1. Accordingly, the Examiner has not presented a *prima facie* case of obviousness for rejecting claims 1, 3-12, 15, 17-21, 25, 26, 28 and 31. *KSR International Co. v. Teleflex Inc.*, 82 U.S.P.Q.2d 1385, 1396 (U.S. 2007).

As further support that a person skilled in the art would not have been motivated to modify Goodwin with Badyal to include the above-cited missing claim limitation, Applicant attaches herewith a declaration under 37 C.F.R. §1.132 executed by Professor Jas Pal Singh Badyal (hereinafter "Declaration"), who is the primary named inventor in both of the Goodwin and Badyal references. In said Declaration, Professor Badyal provides the reasoning as to why one skilled in the art would not have been motivated to modify Goodwin with Badyal to reach the claimed invention of claim 1. Applicant will highlight some of the points provided by Professor Badyal in the Declaration but kindly requests the Examiner to review the entirety of the Declaration.

Goodwin is directed to a liquid-phase coating system in which the coating material is introduced in the form of atomized liquid droplets, at atmospheric pressure. Thus, in this system, the coating material is not in gaseous form even though the surrounding exciting medium may be. Badyal, in contrast, relates to an entirely gas-phase deposition system carried out at reduced pressures. Professor Badyal believes that at the priority date of the present application (June 1, 2002), a person of ordinary skill in the art would have been discouraged from combining the two types of technology.

Gas-phase and liquid-phase plasma deposition systems are not analogous. This means that the skilled person would not have expected it to be straightforward to combine the teachings of Goodwin and Badyal. This is consistent with the fact that Goodwin, in proposing the use of atomization in a plasma deposition system, made no

mention of the possibility of pulsing the exciting medium. The document discussed earlier plasma deposition processes only from the point of view of their disadvantages (the requirement for reduced pressure, and the resultant expense - see paragraph [0003]; the inability to work directly with liquid or solid coating materials - see paragraph [0014]; and the potential loss of chemical properties in the deposited coating - see paragraph [0018]). Despite the fact that pulsing was already well known in gaseous systems, the inventors of Goodwin, including Professor Badyal, did not think that it would be obvious or straightforward to adopt that technique into Goodwin's system, hence the failure to refer to pulsing in the document. Nor did the inventors of Goodwin, including Professor Badyal, provide any incentive for the reader to return to the art on gas-phase plasma deposition in order to improve upon Goodwin's system.

Professor Badyal believes this is because the physical chemistry involved in a gas-phase plasma deposition process is very different to that which governs a process such as the one disclosed in Goodwin, where a liquid coating forming material is atomized into the exciting medium. So too are the mechanisms which act on the various fluids present, and which govern the excitation and eventual deposition of the coating materials. On this basis, the person of ordinary skill in the art would not with confidence expect the advantages of pulsing in gaseous systems to transfer readily to systems involving atomized liquids.

The general principle behind the use of pulsing in gas-phase systems is that during the limited "on" period, the plasma can excite the molecules of the coating forming material sufficiently to allow them to react with one another, but not enough to cause widespread fragmentation. During the "off" period, the excited molecules react to form the intended coating. In this way, pulsing can help to maintain the structural integrity of the coating. It would not, however, have been clear to the skilled person whether or how those mechanisms would apply to atomized droplets of coating forming material. In a purely gaseous system, all molecules, ions and radicals are free to move around. In the atomized system, this is not the case: there are constraints at the macromolecular (droplet) level, for example, due to surface tension and molecular cohesion, and there are the effects of liquid evaporation to take into account. In a liquid-

phase system, the substrate surface can become wetted by the atomized coating material; in the gas-phase process of Badyal, in contrast, there are no droplets present to spread across the substrate.

Moreover, in an atomized liquid system such as that shown in Goodwin, molecules can become trapped within the droplet structure, thus preventing them from behaving in the way that they would if present as a gas. Unexcited molecules (the precursors to the coating species) can become trapped within the droplets, and deposited into the coating layer before having the chance to react. The exciting medium begins to polymerize and cross-link the liquid droplets rapidly following atomization, an effect which works from the outside of each droplet towards its center. This tends to form a "skin" of reacted molecules: inside the skin, unreacted or partially reacted molecules remain trapped. Such complications do not arise in purely gaseous systems.

Any polymerization process generates, in addition to the desired polymer, a distribution of oligomers of varying molecular weights. Lower molecular weight oligomers which become trapped in the droplets will compromise the structural integrity and hence the properties and performance of the coating. These species can also leach out during subsequent use of the coated product, causing toxicity issues.

The process of Goodwin is carried out at atmospheric pressure: the document is clear that this is an essential, and advantageous, feature of the process described. However, this can exacerbate the entrapment problem. Under vacuum, lower molecular weight impurities can more readily be removed, but at atmospheric pressure they are more likely to remain trapped both within the atomized droplets and subsequently in the deposited coating layer. When operating the process described in Goodwin, the inventors, including Professor Badyal, generally noted a strong smell afterwards and subjected the coated products to vacuum treatment following deposition, to remove labile materials trapped inside the coatings (see Example I of Goodwin, and paragraph [0024]).

Professor Badyal believes that the person of ordinary skill in the art, having recognized the entrapment problem in the system of Goodwin, would have had no reason to believe that pulsing would solve it. Rather, he would have expected pulsing to

increase the problem, in that the "off" periods, and the consequent lower average energy of the exciting medium, would increase the risk that molecules in the droplet centers would be unable to react in the desired manner. This too would have discouraged him from combining Goodwin with Badyal. His most obvious solution to the entrapment problem would probably have been to increase the overall power of the excitation field: he would have expected this to allow greater droplet penetration, and thus to avoid the formation of a reacted "skin" surrounding an unreacted center. Yet increasing the power could also have been expected to reduce the structural integrity of the coating due to increased fragmentation of the coating forming material.

Moreover, the entrapment problem which arises with the system of Goodwin is also well documented for systems where gaseous precursors are used in combination with pulsed plasmas at atmospheric pressure. See for example Annex II, which is a paper by Donohoe and Wydeven, *ISPC 4 International Symposium in Plasma Chemistry No. 4* (1979): 765-771. This paper describes atmospheric pressure pulsed discharge polymerization of ethylene (see the abstract and introduction on page 765). In the third paragraph of the results section (page 766), the authors refer to an olefinic odor (similar to ethylene) in the polymerized films, showing that unreacted material had become trapped within the films during their formation. Since the combination of Goodwin with Badyal would also result in an atmospheric pressure, pulsed system, the skilled person would expect it to suffer from similar entrapment issues, exacerbated by the use of atomized droplets. He would therefore be further discouraged from attempting the combination.

Badyal does not address the entrapment problem because the problem does not occur when the coating precursors are free within a low pressure gas phase system rather than trapped within liquid droplets and constrained by atmospheric pressures. Thus, the skilled person would again be concerned that by combining Badyal with Goodwin, he would induce complications which are simply not foreseen, much less addressed, in Badyal. This underlines the fundamental differences between a liquid-phase and a gas-phase system, and thus reinforces Professor Badyal's belief that the person of ordinary

skill in the art would have been discouraged from combining the systems of Goodwin and Badyal.

At the time that Goodwin was published, on April 11, 2002, it represented a departure from the widely known and well understood gas-phase technology. It was not, at that stage, so obvious that techniques used in gas-phase technology would work in the same way in the new atomized liquid system: rather, Professor Badyal believes that the skilled person would quite reasonably have expected complications had he tried to transfer the teachings from the known field across into the new one. It is telling that Goodwin itself says nothing about the application of a pulsed exciting medium to the atomized system it proposes.

Therefore, the person of ordinary skill in the art would have been discouraged from combining the teachings of Goodwin and Badyal at the priority date of the present application. There would not have been a reasonable expectation of success in combining Goodwin with Badyal. A rationale to support a conclusion that a claim would have been obvious is that all the claimed elements were known in the prior art and that one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded nothing more than predictable results to one of ordinary skill in the art. *KSR International Co. v. Teleflex Inc.*, 82 U.S.P.Q.2d 1385, 1396 (U.S. 2007); M.P.E.P. §2143.02. However, as explained above, there is no reasonable expectation of success in combining Goodwin with Badyal (e.g., skilled person would be concerned that by combining Badyal with Goodwin, he would induce complications) and therefore the Examiner has not established a *prima facie* case of obviousness in rejecting claim 1. *In re Rinehart*, 531 F.2d 1048, 189 U.S.P.Q. 143 (C.C.P.A. 1976); *Amgen, Inc. v. Chugai Pharmaceutical Co.*, 927 F.2d 1200, 1207-08, 18 U.S.P.Q.2d 1016, 1022-23 (Fed. Cir.), *cert. denied*, 502 U.S. 856 (1991); M.P.E.P. §2143.02.

Claims 3-12, 15, 17-21, 25, 26, 28 and 31 each recite a combination of features of independent claim 1, and hence claims 3-12, 15, 17-21, 25, 26, 28 and 31 are patentable

over Goodwin in view of Badyal for at least the above-stated reasons that claim 1 is patentable over Goodwin in view of Badyal.

- B. Claim 22 is not properly rejected under 35 U.S.C. §103(a) as being unpatentable over Goodwin in view of Badyal and in further view of Vaartstra.

Claim 22 recites a combination of features of independent claim 1, and hence claim 22 is patentable over Goodwin in view of Badyal and in further view of Vaartstra for at least the above-stated reasons that claim 1 is patentable over Goodwin in view of Badyal.

- C. Claim 23 is not properly rejected under 35 U.S.C. §103(a) as being unpatentable over Goodwin in view of Badyal and in further view of Ruta and Bailey.

Claim 23 recites a combination of features of independent claim 1, and hence claim 23 is patentable over Goodwin in view of Badyal and in further view of Ruta and Bailey for at least the above-stated reasons that claim 1 is patentable over Goodwin in view of Badyal.

II. OBVIOUSNESS-TYPE DOUBLE PATENTING:

The Examiner has provisionally rejected claims 1, 4-12, 15, 17, 18 and 20-23 under the judicially created doctrine of obviousness-type double patenting in view of claims 1, 5-11, 14-21, 25 and 26 of co-pending Application No. 10/514,661 in view of Goodwin. Office Action (10/7/2010), page 7.

Applicant kindly directs the Examiner's attention to M.P.E.P. §804, which states in part that "if a provisional non-statutory obviousness-type double patenting rejection is the only rejection remaining in the earlier filed of the two pending applications, while the later-filed application is rejectable on other grounds, the Examiner should withdraw that rejection and permit the earlier-filed application to issue as a patent without a terminal disclaimer." Furthermore, M.P.E.P. §804 states in part that "if provisional non-obviousness-type double patenting rejections are the only rejections remaining in those applications, the Examiner should withdraw the non-statutory obviousness-type double patenting rejection in the earlier filed application thereby permitting that application to

issue without need of a terminal disclaimer.” Since the current application (Application No. 10/516,448) was filed prior to co-pending Application No. 10/514,661, Applicant kindly requests the Examiner to allow the current application to issue without the need of a terminal disclaimer if the obviousness-type double patenting rejection is the remaining rejection in the present case.

III. ALLOWABLE SUBJECT MATTER:

Applicant thanks the Examiner for allowing claims 33-35 and for the indication of allowability of claim 16.

IV. CONCLUSION:

As a result of the foregoing, it is asserted by Applicant that claims 1, 3-12, 15-23, 25, 26, 28 and 31-35 in the Application are in condition for allowance, and respectfully requests an allowance of such claims. Applicant respectfully requests that the Examiner call Applicant's attorney at the below listed number if the Examiner believes that such a discussion would be helpful in resolving any remaining issues.

Respectfully submitted,

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